

QUALITY SOFTWARE

DATE: March 1969
ID CODE: CBL
DRAWING: 393260
LABEL: INITLOAD
AUTHOR: JEFF
SOURCE: SYM II
OBJECT: Bootstrappable Format

PURPOSE

Initial Loader (INITLOAD) is a bootstrappable loader, which can load tapes punched in the format acceptable to the 700 monitors' absolute loader. Such tapes are produced by an absolute assembly by SYM I or SYM II or by the Linking Absoluter or the Trace/Debug punch option. Tapes punched by Trace/Debug lack checksums and will cause INITLOAD to halt for the checksum error. This error should be ignored (see Loading Errors below). INITLOAD can be appended to the front end of any absolute loadable tape, including the 700 monitor tape. This combined tape will load and execute automatically under control of a 12 word key-in bootstrap. Loading locations and transfer address are read from the absolute tape. Checksums and tape format validity are checked by INITLOAD.

OPERATION - 703

The loading procedure is as follows:

1. Key in the following bootstrap sequences:

<u>Location (Hex)</u>	<u>Instruction</u>
7F	1081
80	03E9
81	02E0
82	0AC1
83	0820
84	1081
85	02ED
86	3800
87	0501
88	0402
89	0130
8A	107F

U is the unit address for the device used, X'E' for the teletype, X'D' for the photoreader. This is not a generalized bootstrap program. It is specifically designed to read a tape of the format in which INITLOAD is supplied.

2. Place INITLOAD in the reader.
3. Depress computer reset.
4. Set program counter to X'80'.
5. Depress RUN.

INITLOAD will be read in, occupying cells 0-7F and will begin execution automatically. It will load any absolute loadable tape attached, or which is then placed in the reader.

LOADING ERRORS

Three possible conditions cause INITLOAD to halt.

A checksum error will cause a halt. The record may be re-read by backspacing the program record, beginning with the LOC record and depressing RUN. The error may be ignored by depressing RUN.

A tape format error occurs if INITLOAD expects a one-word record (a LOC or a transfer address), and receives a multi-word record. Depressing RUN will cause INITLOAD to begin looking for another LOC.

INITLOAD halts if successive file marks are read, indicating no transfer address specified. Depressing RUN will cause INITLOAD to continue loading.

Key-In Bootstrap Description

The key-in bootstrap corresponds to the following sequence:

<u>Location (Hex)</u>	<u>Instruction</u>	<u>Operand</u>	
7F	JMP	WAIT	
START	DOT	UNIT, 9	
WAIT	DIN	UNIT, 0	Get status
	SRC L	1	Move data ready
	SAM		Data ready?
	JMP	WAIT	No
	DIN	UNIT, X'D'	
	STB *	0	Store DATUM
	DXS	1	Is index = 0
	IXS	2	No, increment it
	CAX		Yes, copy 0 or 1 to it
	JMP	X'7F'	Jump through X'7F'

The first non-zero byte of the incoming data must be a 1. This starts the index counting, since the DXS non-skips and the IXS skips thereafter. The bootstrap operates until cell X'7F' is modified by the incoming data to a

'JMP 009'

which stops execution of the bootstrap and begins execution of INITLOAD, which has just been loaded by the bootstrap.

OPERATION - 706

The 706 has the hardware bootstrap feature and the operation is specified, as follows:

1. Place INITLOAD in the reader.
2. Depress the appropriate bootstrap switch, depending on whether the device is the teletype or high speed reader.
3. Depress RUN.

INITLOAD will be read in occupying cells 0-7F and will begin execution automatically, loading any absolute loadable tapes following.

RAYTHEON

700 PROGRAMMING SYSTEMS

LOADER, INITIAL - PAPER TAPE VERSION

QUALITY SOFTWARE

APPENDIX A

ASSEMBLY LISTING

of

LOADER, INITIAL - PAPER TAPE VERSION

Drawing No.

393260

ID Code

CBL

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2 1 PAPER TAPE INITIAL LOADER DN 393260 REV A
3 ENDC
10 PTAPE IS 1
11 CARDS IS 2
12 MTAPE IS 3
13 *****
14 *****
15 ** PLACE DEVICE DEFINITION CARD FOR DESIRED DEVICE LAST
16 DEVICE IS MTAPE
17 DEVICE IS CARDS
18 DEVICE IS PTAPE
19 *****
20 *****
21 PTRU IS 13
22 CDRU IS 8
23 ROMU IS 7
24 ORIG 0
25 * GENERALIZED ROUTINES
26 *
27 *
28 HWUN D X101001
29 GETWORD STX
30 JSX GETBYTE
31 SLL 8
32 STW WTEMP
33 JSX GETBYTE
34 ORI WTEMP
35 EXIT GETWORD

0000 0100
0001 6000
0002 2043
0003 0A18
0004 705E
0005 2043
0006 005E
0007 9000
0008 2800
0009 0009
000A 102C
000B 0A11
000C 7060
000D 204C
000E 2043
000F 078A
0010 0860
0011 100E
0012 2001
0013 0130
0014 0501
0015 0100
0016 705E
0017 605D
0018 2043
0019 9060
001A 3800
001B 304D
001C 0401
001D 0A10
001E 6060
001F A05F
0020 905D
0021 0501
0022 1016

36 BOOT EQU
37 BOOT3 JSX
38 JMP TLOC
39 SLL 1
40 STW LAC
41 ROOT4 JSX
42 ROOT1 JSX
43 CLH X18A1
44 SEQ
45 JMP
46 JSX GETWORD
47 CAX
48 DXS
49 CLR
50 ROOT2 STW
51 JSX GETBYTE
52 LDX LAC
53 STB *
54 STB *
55 IXS
56 NOP
57 STX LAC
58 AND WTEMP
59 LDX COUNT
60 1
61 JMP
62

FIRST BYTE MUST BE 01 FOR PT BOOT
GET THE LEFT BYTE
SAVE IT
GET THE RIGHT BYTE
MERGE IT
RETURN

GET A ONE WORD RECORD
WAS FILE MARK, GET TRANSFER
CHANGE TO BYTE LOC
REMEMBER LOC
START NEW RECORD
LOOK FOR START OF NEXT RECORD
IS THIS IT?

NO
YES, GET BYTE COUNT

SO IT WILL GO - AT CHECKSUM BYTE
ZERO CHECKSUM INITIALLY
SAVE ACCUMULATING CHECKSUM
SAVE
GET THE NEXT BYTE
GET LOC POINTER
STORE DATUM
SET LAST BYTE LOADED FOR CHECKSUM
BUMP LOC
MAY NOT SKIP
SAVE
ACCUMULATE CHECKSUM
COUNT DOWN, TEST FOR END
NOT END

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HL 00010
HL 00020
HL 00090
HL 00100
HL 00110
HL 00120
HL 00130
HL 00140
HL XXXXX
HL XXXXX
BL XXXXX
BL XXXXX
HL 00170
HL 00180
HL 00190
HL 00200
HL 00210
HL 00220
HL 00230
HL 00240
HL 00250
HL 00260
HL 00270
HL 00280
HL 00290
HL 00300
HL 00310
HL 00320
HL 00330

HL 00340
HL 00350
HL 00360
BL 00370
HL 00380
HL 00390
HL 00400
BL 00410
HL 00420
HL 00430
HL 00440
HL 00450
HL 00460
HL 00470
HL 00480
HL 00490
BL 00500
HL 00510
HL 00520
HL 00530
HL 00540
BL 00550
HL 00560
HL 00570
HL 00580
HL 00590
HL 00600

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0023	005F	63	LDW	WTEMP		GET SUM BEFORE LAST BYTE WAS ADDED	RL	00610
0024	0A08	64	SRL	8			RL	00620
0025	A05E	65	ADD	WTEMP		FOLD CHECKSUM	BL	00630
0026	0700	66	CLB	0	CHEKER	STUFFED WITH RIGHT CHECKSUM	BL	00640
0027	0870	67	SNE				BL	00650
0028	1009	68	JMP	ERRSTOP		CHECKS OK	BL	00660
0029	204A	69	JSX	DISCO		STOP DEVICE	RL	00670
002A	0000	70	HLT			STOP HERE IF BAD	RL	00680
002B	1009	71	JMP	BOOT			RL	00690
002C	2031	72	JSX	GOWR	TLAC	GO GET TRANSFER ADDRESS	RL	00700
002D	1029	73	JMP	ERRSTOP		PAUSE FOR SECOND FILE MARK	RL	00710
002E	0130	74	CAX				BL	00720
002F	104A	75	JMP	DISCO		DISCO WILL EXIT TO PROGRAM	BL	00730
0030	0000							
0031	6030	76	GOWR			GET ONE WORD RECORD	RL	00740
0032	204C	77	GOWR2			GET A NEW RECORD	RL	00750
0033	2043	78	GOWR1			GET A BYTE	RL	00760
0034	9030	79	LDX	GOWR=1			RL	00770
0035	0870	80	SNE			TOGGLE KNOWS IF IT'S FILE MARK	RL	00780
0036	1800	81	JMP	* 0		YES RETURN NON-SKIP	RL	00790
0037	078A	82	CLB	X'8A1		IS IT LINE FEED	RL	00800
0038	0A60	83	SEQ				BL	00810
0039	1033	84	JMP	GOWR1		NO, KEEP LOOKING	RL	00820
003A	2001	85	JSX	GETWORD		YES GET THE BYTE COUNT	RL	00830
003B	F05F	86	CMW	D2			BL	00840
003C	0860	87	SEQ				BL	00850
003D	1029	88	JMP	ERRSTOP		NO, ERROR	BL	00860
003E	2001	89	JSX	GETWORD		GET THE ONE WORD	BL	00870
003F	705E	90	STW	WTEMP		SAVE IT	RL	00880
0040	805E	91	LDW	WTEMP			BL	00890
0041	9030	92	EXIT	GOWR,1		AND RETURN SKIP	RL	00900
0042	2801							
		93				TRUE DEVICES=TAPE	HL	00910
		94	*				RL	00920
		95	*			SPECIALIZED ROUTINES FOR PAPER TAPE DEVICES	RL	00930
		96	*				BL	00940
		97	*				RL	00950
0043	02D0	98	GETBYTE	DIN	PTRU,0	GET STATUS	RL	00960
0044	0AC1	99	SRC	L 1		MOVE BIT SEVEN	RL	00970
0045	0820	100	SAM				RL	00980
0046	1043	101	JMP	GETRYTE			RL	00990
0047	02D5	102	DIN	PTRU,5		READ DATUM	RL	01000
0048	0787	103	CLB	X'871		COULD IT BE A FILEMARK	RL	01010
0049	1800	104	JMP	* 0			RL	01020
004A	03D0	105	DOT	PTRU,0		DISCONNECT DEVICE	RL	01030
004B	1800	106	JMP	* 0			RL	01040
004C	02D0	107	SELECT	DIN	PTRU,0	SEE IF THE PHOTOREADER IS SELECTED	RL	01050
004D	0130	108	SELECT1	CAX			RL	01060
004E	0100	109	CLR	X'100			RL	01070
004F	0500	110	SXM				RL	01080
0050	0610	111	LLB	X'101		WAS IT?	RL	01090
0051	A04C	112	ADD	SELECT		NO, CHANGE TO ITY	RL	01100
0052	7043	113	STW	GETRYTE		BUILD STATUS BIN	RL	01110
0053	A05C	114	ADD	XD		BUILD DATA BIN	RL	01120
0054	7047	115	STW	DDIN		SET DATA BIN	RL	01130
0055	7039	116	STW	GOWR2		USE IT FOR SELECT ALSO	RL	01140

0056	700D	117	STW	B00T4	RL	01132
0057	0A04	118	SRL	4	RL	01140
0058	0A14	119	SLL	4	RL	01150
0059	A04E	120	ADD	X100	BL	01160
005A	704A	121	STW	DISCO	RL	01170
005B	1009	122	JMP	B00T	RL	01200
005C	000D	123	D	X'D1	RL	01210
		124	ENDC		RL	01220
005D	0000	183	D	0	RL	01810
005E	0000	184	D	0	BL	01820
005F	0002	185	D	2	RL	01830
0060	0000	186	D	0	BL	01840
0061		187	RES	X'7F1=5	RL	01850
007F	1009	188	JMP	9	BL	01860
	0009	189	END	B00T	BL	01870

CHANGE TO DOT DISCONNECT

NO ERRORS

ROOT	0009	ROOT1	000E	ROOT2	0016	ROOT3	0009
ROOT4	000U	CARDS	0002	CDRU	0008	CHEKER	0026
COUNT	005D	D2	005F	DDIN	0047	DEVICE	0001
DISCH	004A	EHRSTOP	0029	GETBYTE	0043	GETWORD	0001
GWR	0031	GWR1	0033	GWR2	0032	LOC	0060
MTAPE	0003	PTAPE	0001	PTRU	000D	RGMU	0007
SELECT	004C	SELECT1	004D	TL0C	002C	WTEMP	005E
WWUN	0000	X100	004E	XD	005C		